Space Weather Forecast

Issued on Saturday, 23 March 2024 at 13:19 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Further Minor/Moderate radio blackouts (R1/R2) likely. Current S1 solar radiation conditions gradually reducing. Minor to Moderate geomagnetic storms (G1-G2) expected into days 2 and 3 (24-25 Mar) given likely coronal Mass Ejection (CME) and fast wind arrival. Slight chance of a Strong geomagnetic storm (G3).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity rose to become High, with a strong flare from a broad region in the north disk at 23/0133UTC. The large sunspot region approaching centre disk produced Moderate flares at 22/2032UTC and 23/0738UTC. There are now seven sunspots on the visible disc, with a small region emerging in the northwest quadrant recently numbered. The region approaching centre disk remains by far the largest and most complex group on the disc, now showing top tier complexity, having undergone significant growth across the region, as well as a later spreading trend. Changes in other groups were minor by comparison.

The main activity observed on coronagraphs in the period was a large and complex Coronal Mass Ejection (CME) associated with the strong flare. This event was clearly visible in all imagery. Provisional modeling of this CME suggest a likely impact with Earth late on the 24th or early on the 25th of March.

Solar Wind / Geomagnetic Activity: The solar wind has been generally under a slow regime with solar wind speeds at background levels from 340-350km/s. The IMF saw a change from around 22/2230UTC with initial weak positive values giving way to weak to moderate broadly negative values.

The net result of the above solar wind measures was for initially Quite geomagnetic activity, becoming Unsettled to Active from 23/0000UTC onwards.

Energetic Particles / Solar Radiation: Solar radiation rose following the strong flare to rise above S1 levels from 23/0815UTC and remains elevated.

Four-Day Space Weather Forecast Summary

Solar Activity: Generally Moderate activity is expected, with further Moderate flares likely from the large region approaching centre disk and a slight chance of Strong flares. The most significant front side region (AR3615) remains present throughout the four days, with oncoming active regions in the northeast likely. The flare risk is held constant throughout the four days.

Solar Wind / Geomagnetic Activity: The is one Earth-directed CMEs in the current forecast, this is associated with the Strong flare a broad region north of the northern disk at 23/0133UTC. This produces a large and complex CME provisional modeled to arrive early on day 3 (25 Mar), with winds perhaps increasing to 550-600km/s before slowly declining. The other notable enhancement will be from the arrival of faster winds, most likely on day 2 (24 Mar) with Slightly

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Elevated to Elevated solar winds forecast (450-500km/s).

Geomagnetic activity initially Unsettled to Active with a slight chance of isolated G1 minor geomagnetic storm intervals. Into days 2 and 3 (24-25 Mar) G1-G2 minor to moderate geomagnetic storm intervals are expected with a slight chance G3 strong geomagnetic storm intervals late on day 2 into early day 3 (24-25 Mar), given the expected arrival of the above CME.

Energetic Particles / Solar Radiation: Solar radiation is currently above the S1 minor storm threshold following recent Strong flare activity, and values peaking above the S2 moderate storm threshold remains possible early in day 1 (23 Mar). Radiation levels expected to slowly decline back towards background from early day 2 onwards in the absence of further significant flare activity, albeit with a rising of enhancement from any notable flaring from the large sunspot region near centre disk.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	80	80	20
Strong	G3	No	1	20	20	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	70	70	70	70
Very Active	R3 to R5 X	Yes	20	20	20	20

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	99	70	30	20
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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